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| EXAMINER | |
|---|---|
| CERULLO, LILIANA P | |
| **ART UNIT** | **PAPER NUMBER** |
| 2629 | |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| *Office Action Summary* | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/566,493 | WILLIS, DONALD HENRY | |
| | Examiner | Art Unit | |
| | LILIANA CERULLO | 2629 | |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --***

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *23 October 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,3-15 and 17-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-15 and 17-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/23/2009 has been entered. In the submission the Applicant amended claims 1, 3, 5, 7, 10, 14-15 and 19; and canceled claims 2 and 16. Currently claims 1, 3-15 and 17-20 are pending.

### *Claim Objections*

2. **Claim 3** is objected to because of the following informalities: Claim 3 depends on now canceled claim 2; but it should be dependent on claim 1 or canceled. For the purpose of examination, the examiner interpreted claim 3 to depend on claim 1. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. **Claims 1, 4, 6, 7, 9, 11, 13, 15, 18 and 20** are rejected under 35 U.S.C. 102(b) as being anticipated by Morgan in US 6,324,006.

5. Regarding **claim 1**, Morgan teaches a method for operating a sequential color display system (col. 1 lines 25-27) including a color changer (color wheel of Fig. 1) and an imager (DMD required for Fig. 6), which operate in combination to sequentially illuminate at least one pixel with each of a set primary colors (col. 1 lines 30-42, 58-67 referring to sequential display of primary colors and the use of DMD arrays; col. 5 lines 27-31 regarding the discussion referring to a single pixel. Also see Fig. 1 showing RGBW), comprising the steps of:

applying a control signal to the imager (DMD control in Fig. 6) to cause the imager (DMD required for control of Fig. 6 and col. 11 lines 42-49) to illuminate the at least one pixel for each primary color (RGB of Fig. 1) at a brightness level in accordance with the control signal (col. 4 lines 26-36, referring to intensity values);

using light occurring during at least one first spoke (col. 5 lines 16-19), corresponding to a first interval when the color changer transitions from one primary color to another (col. 2 lines 9-13 and Figs. 1-3), when the at least one pixel has a brightness level above a first prescribed threshold for at least one primary color (Col. 7 lines 25-47 referring to a white intensity value of 144 as the threshold value to turn on the spoke period. However, please note that although the example is made with reference to a white segment 8-bit intensity, lines 37-42 explain that the required intensity word size is a function of the size of the filter color segment, and lines 46-49

explicitly disclose that a white segment is not required and that the primary colors can be used; lines 55-57 explain that RGB data includes white intensity data, and finally lines 65-67 clearly explain that the data [i.e. threshold intensity data e.g. 144] used to turn on the spoke period can be RGB data, thus teaching a threshold intensity value for at least one primary color); and

altering the control signal (col. 11 lines 42-59 referring to DMD waveform) when the light is used during such spoke (col. 11 lines 16-22) to decrease brightness of the primary color immediately before and the primary color immediately after the spoke (recall discussion above where although the example is given with respect to the W bus the data can be from the RGB data per col. 7 lines 65-67. Col. 12 lines 16-26 where the RGB channels grayscale codes can be subtracted; and Table 2 which gives a clear example where the RGB hues are offset negatively, i.e. decreasing brightness, see values for the 7-bitW_Bus1 for e.g. intensities of 6-14) to compensate for the brightness increase caused by using the light during such spoke (col. 12 lines 14-35 referring to offsetting the value of RGB).

6. Regarding **claim 7**, Morgan teaches a method for operating a sequential pulse width modulated display system (col. 1 lines 25-27. PMW is required for sequential color DMDs of line 38) having a color changer (color wheel of Fig. 1) and an imager (DMD required for Fig. 6) that operate in combination to sequentially illuminate at least one pixel for each of a set of primary colors (col. 1 lines 30-42, 58-67 referring to sequential display of primary colors and the use of DMD arrays; col. 5 lines 27-31 regarding the

discussion referring to a single pixel. Also see Fig. 1 showing RGBW), comprising the steps of:

applying a plurality of sequences of pulse width segments to the imager (col. 16 lines 42-49 where the DMD [image] is assigned with mirror-on-time weights for bit, split and spoke planes, thus teaching a plurality of sequences of pulse width segments), each pulse width segment causing the imager to illuminate the at least one pixel (col. 4 lines 16-26 where in each frame the display is illuminated and col. 12 lines 30-44 where the data written to the DMD and the mirrors are moved accordingly) for each primary color at a brightness level (col. 4 lines 26-36 referring to intensity of primary colors) in accordance with the actuation state of pulses within the pulse segment for said at least one pixel (col. 11 lines 42-49 referring to actuation of a DMD in a binary state);

using light occurring during at least one first spoke (col. 5 lines 16-19), corresponding to a first interval when the color changer transitions from one primary color to another (col. 2 lines 9-13 and Figs. 1-3), when said at least one pixel has a brightness for at least one primary color above a prescribed threshold (Col. 7 lines 25-47 referring to a white intensity value of 144 as the threshold value to turn on the spoke period. However, please note that although the example is made with reference to a white segment 8-bit intensity, lines 37-42 explain that the required intensity word size is a function of the size of the filter color segment, and lines 46-49 explicitly disclose that a white segment is not required and that the primary colors can be used; lines 55-57 explain that RGB data includes white intensity data, and finally lines 65-67 clearly explain that the data [i.e. threshold intensity data e.g. 144] used to turn on the spoke

period can be RGB data, thus teaching a threshold intensity value for at least one primary color); and

altering at least one sequence of pulse width segments (col. 11 lines 42-59 referring to DMD waveform) when the light is used during the at least one first spoke (col. 11 lines 16-22) to decrease brightness of the primary color immediately before and the primary color immediately after the spoke (recall discussion above where although the example is given with respect to the W bus the data can be from the RGB data per col. 7 lines 65-67. Col. 12 lines 16-26 where the RGB channels grayscale codes can be subtracted; and Table 2 which gives a clear example where the RGB hues are offset negatively, i.e. decreasing brightness, see values for the 7-bitW_Bus1 for e.g. intensities of 6-14) to compensate for the brightness increase caused from using the light during the at least one first spoke (col. 12 lines 14-35 referring to offsetting the value of RGB).

7. Regarding **claim 11**, Morgan teaches a method for operating a sequential pulse width modulated display system (col. 1 lines 25-27. PMW is required for sequential color DMDs of line 38) having a color changer (color wheel of Fig. 1) which causes each of a set of primary colors (RGB of Fig. 1) to sequentially illuminate an imager (DMD required for Fig. 6) which lights up each of a plurality of pixels for each primary color (col. 1 lines 30-42), comprising the steps of:

applying a plurality of sequences of pulse width segments to the imager, each pulse width segment causing the imager to illuminate each pixel (col. 1 lines 58-67,

where the pulse width segment is a primary color period. Because there are four colors in Fig. 1, there are a plurality of sequences of pulse width segments applied to the imager, corresponding to each color) for each primary color at a brightness level (col. 4 lines 26-36) in accordance with the actuation state of pulses for each pixel within the pulse segment (col. 11 lines 42-49 referring to actuation of a DMD in a binary state);

choosing at least one first spoke (col. 6 lines 60-63), corresponding to a first interval when the color changer transitions from one primary color to another primary color (col. 2 lines 9-13);

altering at least one sequence of pulse width segments (col. 11 lines 42-59 referring to DMD waveform) above a prescribed pixel brightness level for at least one primary color (Col. 7 lines 25-47 referring to a white intensity value of 144 as the prescribed pixel brightness to turn on the spoke period. However, please note that although the example is made with reference to a white segment 8-bit intensity, lines 37-42 explain that the required intensity word size is a function of the size of the filter color segment, and lines 46-49 explicitly disclose that a white segment is not required and that the primary colors can be used; lines 55-57 explain that RGB data includes white intensity data, and finally lines 65-67 clearly explain that the data [i.e. prescribed pixel brightness level e.g. 144] used to turn on the spoke period can be RGB data, thus teaching a prescribed pixel brightness level for at least one primary color) to selectively increase pixel brightness for at least one primary color (col. 5 lines 4-19 referring to increasing the intensity of images and recall col. 12 lines 43-49 and 65-67 where the data can be either RGB and there is no requirement for a white segment, thus teaching

that in an RGB only wheel, the pixel brightness is increased for at least one primary color by increasing the white component of the primary color) by using light during the at least one first spoke (col. 5 lines 16-22) and to decrease pixel brightness during the pulse width segments occurring substantially immediately before and after the at least one first spoke in order to compensate for the brightness increase from the spoke light (recall discussion above where although the example is given with respect to the W bus the data can be from the RGB data per col. 7 lines 65-67. Col. 12 lines 16-26 where the RGB channels grayscale codes can be subtracted; and Table 2 which gives a clear example where the RGB hues are offset negatively, i.e. decreasing brightness, see values for the 7-bitW_Bus1 for e.g. intensities of 6-14).

8. Regarding **claim 15**, Morgan teaches a sequential color display system (col. 1 lines 25-27), comprising:

a light source (white light beam of col. 1 line 53);

an imager (DMD of col. 1 lines 37-42) for directing light from the light source to selectively illuminate each of a plurality of pixels on a display screen (col. 1 lines 43-50. A display screen is required for a display system as described);

a color changer (color wheel of Fig. 1) for sequentially changing the color of the light illuminating each of the plurality of pixels (col. 1 lines 51-67), and

a controller (Fig. 6) for

(a) applying a control signal to the imager (DMD control in Fig. 6) to cause the imager (DMD required for Fig. 6 and col. 11 lines 42-49) to illuminate an associated

pixel for each primary color (RGB of Fig. 1) at a brightness level in accordance with the control signal (col. 4 lines 26-36, referring to intensity values);

(b) using light occurring during at least one first interval (col. 5 lines 16-19) in which the color changer transitions from one primary color to another (col. 2 lines 9-13 and Figs. 1-3), when at least one primary color has a brightness level above a first prescribed threshold (Col. 7 lines 25-47 referring to a white intensity value of 144 as the threshold value to turn on the spoke period. However, please note that although the example is made with reference to a white segment 8-bit intensity, lines 37-42 explain that the required intensity word size is a function of the size of the filter color segment, and lines 46-49 explicitly disclose that a white segment is not required and that the primary colors can be used; lines 55-57 explain that RGB data includes white intensity data, and finally lines 65-67 clearly explain that the data [i.e. threshold intensity data e.g. 144] used to turn on the spoke period can be RGB data, thus teaching a threshold intensity value for at least one primary color); and

(c) altering the control signal (col. 11 lines 42-59 referring to DMD waveform) when the light is used during the at least one first spoke (col. 11 lines 16-22) to decrease the brightness of the primary color immediately before and the primary color immediately after the at least one first spoke (recall discussion above where although the example is given with respect to the W bus the data can be from the RGB data per col. 7 lines 65-67. Col. 12 lines 16-26 where the RGB channels grayscale codes can be subtracted; and Table 2 which gives a clear example where the RGB hues are offset negatively, i.e. decreasing brightness, see values for the 7-bitW_Bus1 for e.g.

intensities of 6-14) to compensate for the brightness increase caused from using the light during said at least one first spoke (col. 12 lines 14-35 referring to offsetting the value of RGB).

9. Regarding **claims 4, 9, 13 and 18**, Morgan teaches wherein the step of using light occurring during at least one additional spoke (col. 9 lines 55-67 referring to two spoke bit period for 151 value of WBUS and a third spoke period for value 158 shown in Fig. 5), in addition to the light used during the at least one first spoke (as shown in Fig. 5), when said at least one color has a brightness level above a second threshold (where the threshold is for white signal component to be over 151 or 158 as shown in Fig. 5. Recall that col. 7 lines 65-67 explain that the data can be RGB data, thus teaching the brightness level above 158 for at least RGB. Please also note that a threshold of white 144, 151 or 158 would require different values of RGB to form the white, thus teaching a second threshold for each color).

10. Regarding **claims 6 and 20**, Morgan teaches wherein the step of applying the control signal (DMD control in Fig. 6) includes applying a plurality of sequences of pulse width segments (col. 1 lines 58-67, where the pulse width segment is a primary color period. Because there are four colors in Fig. 1, there are a plurality of sequences of pulse width segments applied to the imager, corresponding to each color), each pulse width segment (color period) causing the imager (DMD required for Fig. 6) to illuminate an associated pixel for each primary color at a brightness level (col. 4 lines 26-36) in

accordance with a total actuation of pulses (col. 11 lines 42-49), within the pulse segment for such associated pixel (col. 4 lines 26-36).

### *Claim Rejections - 35 USC § 103*

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. **Claims 3, 5, 8, 10, 12, 14, 17 and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan in US 6,324,006.

13. Regarding **claims 3, 8, 12 and 17**, Morgan fails to explicitly teach the brightness threshold differing for each primary color. However, Morgan discloses that the eye perceives color in the natural world at different intensities and to form white most display systems take into account these differences (col. 4 lines 44-67), that the white may come from a combination of RGB (col. 7 lines 43-67), and that the maximum intensity value, which is the value that determines the required intensity to turn on the spoke period, is a function of the size of the filter color segment (col. 7 lines 37-42). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention, to vary the brightness threshold for each primary color to account for the difference perceived by the human eye and produce natural looking whites (col. 4 lines 63-66) and for the difference in filter size (col. 7 lines 37-42).

14. Regarding **claims 5, 10, 14 and 19**, Morgan fails to explicitly teach the second threshold differing for each primary color. However, Morgan discloses that the eye perceives color in the natural world at different intensities and to form white most display systems take into account these differences (col. 4 lines 44-67), that the white may come from a combination of RGB (col. 7 lines 43-67) ), and that the maximum intensity value, which is the value that determines the required intensity to turn on the spoke period, is a function of the size of the filter color segment (col. 7 lines 37-42). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention, to also vary the second threshold for each primary color to account for the difference perceived by the human eye and produce natural looking whites (col. 4 lines 63-66) and for the difference in filter size (col. 7 lines 37-42).

## ***Response to Arguments***

15. Applicant's arguments filed 10/23/2009 have been fully considered but they are not persuasive. In the Remarks pg. 8, the Applicant argues with respect to independent claims 1, 7, 11 and 15, that Morgan discloses boosting the brightness of white, but not boosting the brightness of a primary color such as red, blue or green using individual spokes.

The examiner must respectfully disagree, while true that Morgan's invention is directed toward creating brighter images (col. 4 lines 20-25) by using the spoke lights to contribute to the white component of the image, and not to specifically increasing the *grayscale intensity of a single* primary color with the spoke lights; the language in either

of independent claims 1, 7 and 15 does not clearly point to the spoke lights being used for boosting the brightness of a single primary color, such as red, green or blue. The claim language in claim 11 (lines 12-13) does require "selectively increase pixel brightness for at least one primary color", but the examiner gave the broadest reasonable interpretation to the term "pixel brightness" and therefore, interpreted the pixel brightness to refer to the overall quality of the image as improving the white component of at least one primary color (see explanation in rejection above), and not to specifically increasing the grayscale intensity of a single primary color. The examiner kindly suggests clarifying in the claims the meaning of the word brightness as disclosed by the specification and figures, and the boosting of the brightness for a single primary color with the help of the spoke light (please cite support in specification and figures).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LILIANA CERULLO whose telephone number is (571)270-5882. The examiner can normally be reached on Monday to Thursday 8AM-4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amr Awad can be reached on 571-272-7764. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. C./
Examiner, Art Unit 2629

/Amr Awad/
Supervisory Patent Examiner, Art Unit 2629